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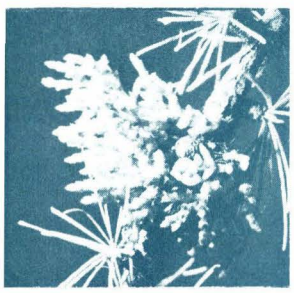

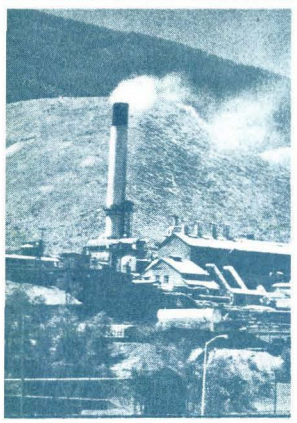

FOREST ENVIRONMENTAL PROTECTION

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OBSERVATIONS OF IMPACT ON THE NEZPERCE NATIONAL FOREST CAUSED BY THE DOUGLAS-FIR TUSSOCK MOTH

By

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INTRODUCTION

The Douglas-fir tussock moth, *Orgyia pseudotsugata* McDunnough, caused 23,000 acres of aerially visible defoliation on the Nezperce National Forest and adjacent private lands in 1973. Most of the severe defoliation occurred near Riggins, Idaho. Defoliated areas were characterized by sharply defined margins with no defoliation within a few meters of the margins. This provided an opportunity to compare the growth rate of defoliated trees with nondefoliated trees in the same stand type. The objectives of this evaluation are to determine the impact of tussock moth defoliation in terms of mortality and growth reduction in several areas of the Nezperce National Forest and to monitor the rate of recovery in the defoliated stands during the next 2 years. This is an interim report on this study, which is being funded by the USDA Douglas-fir Tussock Moth Program. We appreciate the assistance of Roland Stoleson and Ted Anderson from the Salmon River District.

METHODS

Helicopter reconnaissance was made in September 1975 to assess the damage and recovery of 20 defoliated spots near Riggins, Idaho (Figure 1). The 1973 aerial detection map was used to locate damaged stands.

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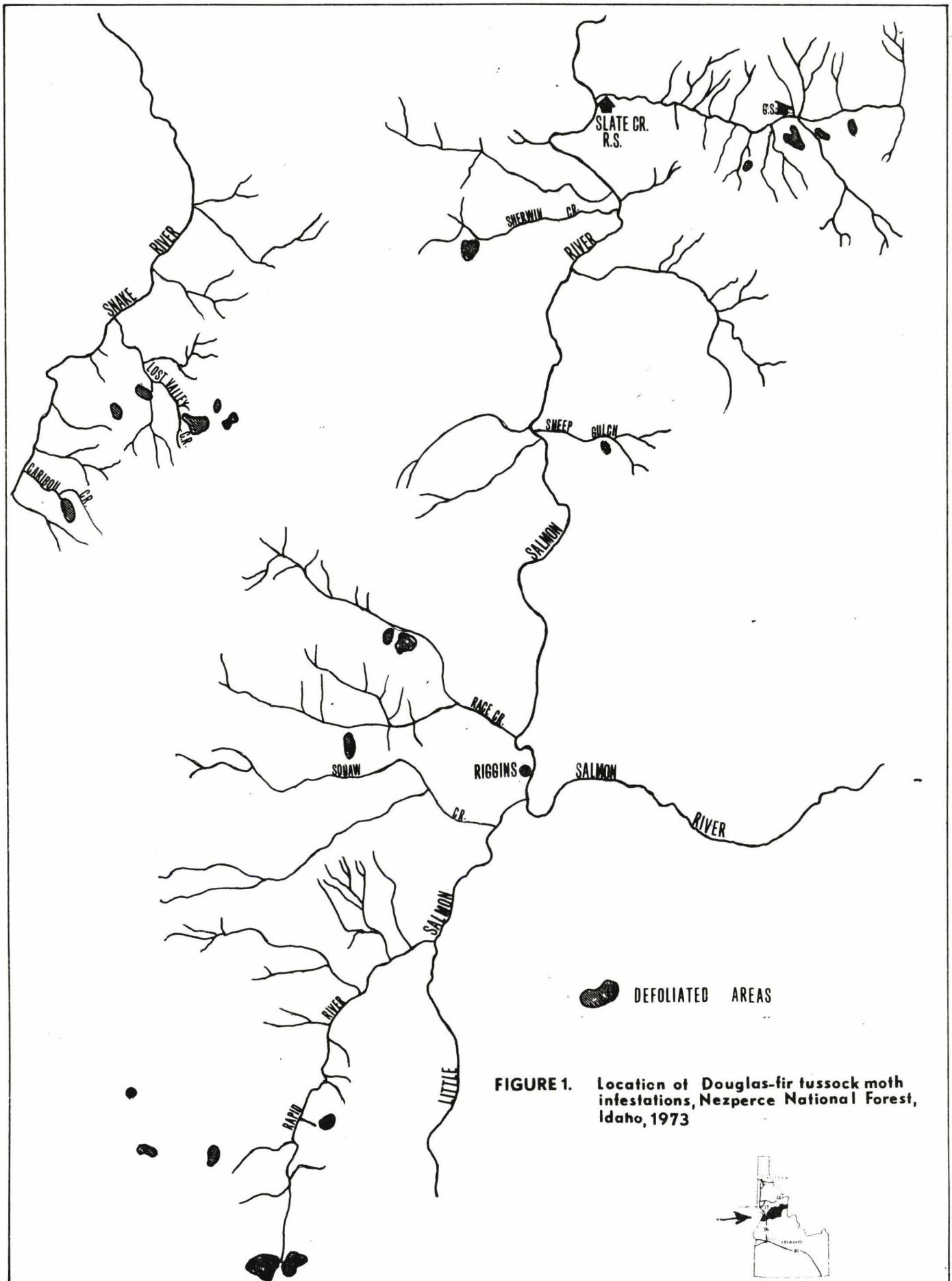


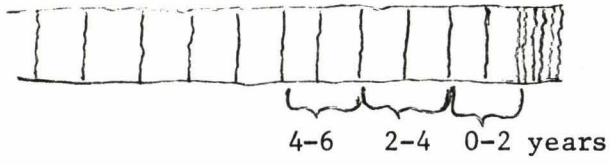
FIGURE 1. Location of Douglas-fir tussock moth infestations, Nezperce National Forest, Idaho, 1973

In addition, four areas were examined on the ground to measure mortality and growth loss. Two of the areas served as checks and were located in the same stand type, but not more than one-eighth mile (0.25 kilometer) from the defoliated areas. A variable-size plot cruise, BAF 40, was used to select trees for volume, growth, and damage class measurements. Variable plots were established on 5- by 5-chain (100- by 100-meter) grid. The diameter of each tree was measured to the nearest 0.1 inch (2.5 mm) and height to the nearest 1 foot (one-third meter). In addition, trees were classified into one of the following five damage classes:

Damage class	
0	No defoliation.
1	Less than one-third defoliated.
2	One-third to two-thirds defoliated.
3	More than two-thirds defoliated.
4	Dead because of defoliation.

Increment cores were obtained from each tree and placed into straws for binocular measurement of ring widths to the nearest 0.01 inch (2.5 mm). Growth periods of 0 to 2 years, 2 to 4 years, and 4 to 6 years were recorded for each core (Figure 2).

Figure 2.--Growth periods measured for each increment core



Since growth was completed in 1973 before heavy defoliation occurred, only the ring width of 1974 and 1975 would be expected to be suppressed. Stepwise multiple regression was employed to determine independent variables affecting the last 2 years' growth. Covariance analysis was used to compare defoliated areas against nondefoliated areas. Volume per acre by damage class was obtained by using the R-1 sale cruise computer program.

RESULTS

Results from the aerial reconnaissance showed that significant mortality was visible in 9 of the 20 areas observed. The effects of defoliation were still visible in the remaining stands 2 years following defoliation. Foliage was thin and appeared light green when compared to undefoliated areas. Most of the stands were on steep north slopes at the lower portion of the Douglas-fir type. The results of the ground cruise showed that 1,088 board feet per acre, or 16.81 percent of the green stand, had been killed by tussock moth at Lucile Creek, and 3,238 board feet per acre, or 17.6 percent of the green stand, were killed in Race Creek (Table 1).

Table 1.--Volume per acre by area and damage class

Area	Damage class				
	0	1	2	3	4
Lucile Creek defoliation	0	0	259	5,126	1,088
Lucile Creek check	8,629	0	0	0	0
Race Creek defoliation	1,933	2,129	5,423	5,674	3,238
Race Creek check	15,125	0	0	0	0

The analysis of growth rates showed that a significant difference occurred between the ring widths of defoliated and undefoliated stands, and that growth was significantly depressed in the damaged stands (Table 2).

Table 2.--Covariance analysis of radial growth

Area	Regression coefficient	"F" value	Adjusted[a/]		"F" value
			Inches	MM	
Lucile Creek defoliation	0.122	4.12	0.061	1.549	5.96
Lucile Creek check	.299		.088	2.235	
Race Creek defoliation	.135	28.03	.049	1.244	12.87
Race Creek check	.410		.071	1.803	

a/ Width of 1974 and 1975 growth ring adjusted by covariance analysis.

The analysis showed that growth was reduced 30.68 percent at Lucile Creek and 30.98 percent at Race Creek.

CONCLUSIONS

The Douglas-fir tussock moth caused significant mortality and growth loss after 1 year of severe defoliation on the Nezperce National Forest. The stands examined have not fully recovered, and additional tree mortality and growth reduction can be expected. Impact of the defoliation will be examined again in the fall of 1976.